

# Jackson Steel Site

## Mineola/North Hempstead, New York



Region 2

July 2004

### PURPOSE OF PROPOSED PLAN

This Proposed Plan describes the remedial alternatives considered for the contaminated soil, soil vapor, and groundwater at the Jackson Steel Superfund site, and identifies the preferred remedy with the rationale for this preference. The Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA) in consultation with the New York State Department of Environmental Conservation (NYSDEC). EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and Sections 300.430(f) and 300.435(c) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The alternatives summarized here are described in the March 2004 Remedial Investigation/Feasibility Study (RI/FS)<sup>1</sup> Report. EPA and the NYSDEC encourage the public to review these documents to gain a more comprehensive understanding of the site and Superfund activities that have been conducted at the site.

This Proposed Plan is being provided as a supplement to the RI/FS report to inform the public of EPA's and NYSDEC's preferred remedy and to solicit public comments pertaining to all of the remedial alternatives evaluated, including the preferred soil and groundwater alternatives. EPA's preferred soil and soil vapor remedy consists of in-situ soil vapor extraction (ISVE)<sup>2</sup> for subsurface soils contaminated with volatile organic compounds (VOCs) and excavation and off-site disposal for the contents of the dry wells, the trench and sumps inside the building, and surface soils contaminated with VOCs, semi-volatile organic compounds (SVOCs), pesticides, and metals. In addition, the building floor would be decontaminated. To address the contaminated groundwater, EPA's preferred remedy is in-situ chemical treatment of the contaminated upper aquifer in the source area and extraction and treatment of the contaminated lower aquifer. In consultation with NYSDEC, the extent of the off-site groundwater contamination and its potential impact on the public water supply wells would be determined during the remedial design phase. Based on the evaluation of off-site groundwater data that would be collected, if it is determined that site-related contamination is affecting the aquifer, the proposed remedy would be expanded, as necessary, to include the off-site groundwater contamination and its potential impacts on the public water supply wells.

The remedy described in this Proposed Plan is the preferred remedy for the site. Changes to the preferred remedy, or a change from the preferred remedy to another remedy, may be made if public comments or additional data indicate that such a change will result in a more appropriate remedial action. The final decision regarding the selected remedy will be made after EPA has taken into consideration all public comments. EPA is soliciting public comment on all of the alternatives considered in the Proposed Plan and in the detailed analysis section of the RI/FS report because EPA and NYSDEC may select a remedy other than the preferred remedy.

<sup>1</sup> An RI/FS determines the nature and extent of the contamination at and emanating from a site and identifies and evaluates remedial alternatives.

<sup>2</sup> ISVE involves drawing air through a series of wells to volatilize the solvents in the soils. The extracted vapors are then treated.



### MARK YOUR CALENDAR

**July 22, 2004 - August 21, 2004:**  
Public comment period on the Proposed Plan.

**August 10, 2004 at 7:00 P.M.:**  
Public meeting at the Mineola Village Hall, Gymnasium, 155 Washington Avenue, Mineola, New York 11501, 516-746-0750.

### COMMUNITY ROLE IN SELECTION PROCESS

EPA and NYSDEC rely on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, the RI/FS report and this Proposed Plan have been made available to the public for a public comment period which begins on July 22, 2004 and concludes on August 21, 2004.

A public meeting will be held during the public comment period at the Mineola Village Hall Gymnasium on August 10, 2004 at 7:00 p.m. to present the conclusions of the RI/FS, to elaborate further on the reasons for recommending the preferred remedy, and to receive public comments.

Comments received at the public meeting, as well as written comments, will be documented in the Responsiveness Summary Section of the Record of Decision (ROD), the document which formalizes the selection of the remedy.

**INFORMATION REPOSITORIES**

Copies of the Proposed Plan and supporting documentation are available at the following information repositories:

**Town of North Hempstead**  
**200 Plandome Road**  
**Manhasset, NY 11030**  
**516-489-5000**

*Hours:* Monday - Friday, 8:15 A.M. - 4:00 P.M.

**Garden City Public Library**  
**60 Seventh Street**  
**Garden City, NY 11530**  
**516-742-8405**

*Hours:* Monday - Thursday, 9:30 A.M. - 9:00 P.M.  
 Friday, 9:30 A.M. - 5:30 P.M.  
 Saturday, 9:00 A.M. - 5:00 P.M.  
 Sunday, 1:00 P.M. - 5:00 P.M.

**Village of Mineola Hall**  
**155 Washington Avenue**  
**Mineola, NY 11501**  
**516-746-0750**

*Hours:* Monday - Friday, 8:30 A.M. - 4:00 P.M.

**USEPA-Region II**  
**Superfund Records Center**  
**290 Broadway, 18th Floor**  
**New York, New York 10007-1866**  
**(212) 637-4308**

*Hours:* Monday - Friday, 9:00 A.M. - 5:00 P.M.

Written comments on this Proposed Plan should be addressed to:

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**SCOPE AND ROLE OF ACTION**

The primary objectives of this action are to remediate the source of contamination at the site, reduce and minimize the potential for soil vapor intrusion, reduce and minimize the downward migration of contaminants to the aquifer, restore groundwater quality, and minimize any potential future health and environmental impacts.

**SITE BACKGROUND****Site Description**

The site includes a parcel of property located at 435 First Street in Mineola, North Hempstead, Nassau County, New York in a residential/light commercial area. (See Figure 1 for a site plan.) The 1.5-acre property contains a one-story 43,000-square-foot former metal-forming facility and an approximately 10,000-square foot paved parking area. The building consists of two sections—the original building, constructed in 1959, is located closest to First Street, and the back section, which was added in 1963. The former office space is located along the north wall, and a loading dock is located in the southwest corner of the front section of the building. The building is currently inactive and predominantly empty, except for miscellaneous small equipment and supplies abandoned by interim tenants of the building. An old vertical aboveground storage tank—possibly used to store degreasing substances—is situated in the front section of the building next to the former offices. A trench is located in the floor along the inside western wall of the building extension, above which a degreasing station is suspected to have been located. Two sumps are located in the front section of the building behind the former office space. One sump is located under the heater and the other one is located along the eastern wall of the main building. A third sump is located outside the building, near the main entrance.

A fence extends along the southern border of the parking area and separates the Jackson Steel site from the adjacent former billiards parlor. A narrow strip of unpaved soil is also located along the east wall of the building, between the building and the wooden fence separating the Jackson Steel property from the adjacent apartment complex.

Subsurface features include two dry wells designed to collect stormwater runoff located under the parking area to the west of the building and a third dry well is located under the loading dock area.

The site is bordered to the north by residential, single-family dwellings, to the east by multiple-family dwellings in a two-story apartment complex, to the south by the former billiards parlor and a building that housed a daycare center until April 2002, and to the west by an office building and restaurant and the predominantly commercial properties along Herricks Road.

The local topography surrounding the site consists of relatively flat terrain, with gentle changes in elevation that typically do not exceed twenty feet of vertical relief. The site itself is flat with no discernable change in topography, and has an elevation of 146-148 feet above mean sea level.



Figure 1--Jackson Steel Site Plan

Source: Rettew Associates, Inc.

Village of Mineola supply well #4 and Garden City Village supply well #12 are located within a half-mile radius of the site (east-southeast or sidegradient of the property).

There are no private wells in the area. Area residents utilize municipal water.

The property, which has been used for industrial/commercial purposes since it was constructed, has been zoned for a number of different uses through the past several decades. The property is presently zoned B-1 for business use as retail or office space. According to the Village of Mineola's Department of Planning and Development, it is not anticipated that the land use will change in the future.

### **Site Geology/Hydrogeology**

Surface soils at the site are Upper Pleistocene Deposits, which are commonly referred to by the name of the hydrogeologic unit that they form, the Upper Glacial Aquifer. This Upper Glacial unit consists, predominantly, of varying consistencies of intermixed-to-interbedded, brown-orange-yellow sands and gravels to a depth of approximately 105 feet bgs. Some silts were observed, mainly near the ground surface, but also in smaller quantities deeper in the formation and in minor lenses throughout. Little or no clay was observed.

Groundwater beneath the site occurs within the overburden silty sand of the Upper Glacial Aquifer. The depth to groundwater is approximately fifty feet bgs.

At approximately 105 feet bgs, the top of the Magothy Formation is encountered. The top of the formation (the Magothy Confining Bed) consists of characteristic fine-to-medium sands interbedded with clay and sandy-silty clay, with gray coloration, and the presence of organic lignite (wood) fragments. The Magothy Confining Bed appears to be a localized occurrence overlying the Magothy Aquifer in the vicinity of the Jackson Steel site. Its observed thickness at the site was approximately 296 feet. This thickness decreases significantly over a relatively short lateral distance to the northeast (approximately 600 feet) to 42 feet thick. Its thickness decreases to approximately 167 feet approximately 600 feet southwest of the site.

The silty clay of the Magothy Confining Bed is believed to be a semi-confining layer effectively separating the Upper Glacial Aquifer and the Magothy Formation.

The groundwater flow in the Upper Glacial and Magothy Aquifers is to the southwest.

### **Property History**

The property was used from the mid-1970s until 1991 as a "roll form metal shapes" manufacturing facility. Degreasers, including tetrachloroethylene (PCE), trichloroethylene (TCE), and 1,1,1-trichloroethane (TCA), were used at the facility

until 1985. Sludges from degreasing equipment were stored in drums and in an on-site 275-gallon tank.

The analytical results from samples collected by the Nassau County Department of Health in the early 1990s from within, around, and below three on-site dry wells indicated the presence of PCE, TCE, 1,1,1-TCA, 1,2-dichloroethylene (DCE), and 1,1-dichloroethane (DCA) at depths down to 40 feet below the ground surface. PCE, TCE, 1,1,1-TCA, 1,2-DCE, and 1,1-DCA were also detected in groundwater samples collected from monitoring wells located downgradient of the dry wells.

Dumping of wastes into the dry wells, spills, and leaks during the facility's operations and from drums storing various chemicals are the likely sources of the contamination found at the site.

In October 1999, the site was proposed for placement on EPA's Superfund National Priorities List (NPL). On February 4, 2000, the site was listed on the NPL.

EPA initiated a search to identify Potentially Responsible Parties (PRPs) in January 2000. Viable PRPs have not been found.

Following commencement of field work in October 2001, because of concerns about the proximity of the site to a daycare center, the Nassau County Health Department performed air sampling inside the building. The air samples detected PCE at levels below the Health Department's guideline for indoor PCE exposure. The levels were also within EPA's acceptable cancer and non-cancer risk ranges. Given the sensitivity of the population exposed (preschool children), the Health Department collected additional samples in mid-December 2001. At that time, indoor testing was also conducted inside the Jackson Steel building and a restaurant located adjacent to the site. The results, which were received in mid-January 2002, indicated that PCE levels in the indoor air of several rooms in the daycare facility were above the Health Department's guideline for indoor PCE exposure. In addition, the maximum level exceeded EPA's acceptable non-cancer risk level. Low levels of PCE were detected in the air samples from the Jackson Steel building and the restaurant. After receiving the daycare center's results, EPA's emergency response team installed a vacuum extraction system under the concrete slab of the building to prevent any contaminants from entering the building in case the soil and groundwater under the building are the source. In addition, in order to provide fresh air circulation in the building, a ventilation system was installed by the daycare center's contractor. Samples taken to assess the effectiveness of the above measures showed that the PCE levels in the air were significantly below the New York State Health Department guideline and below EPA's acceptable non-cancer risk levels.

Because elevated PCE levels were detected in a billiards club which shared common walls with the Jackson Steel site

building and the former daycare facility, EPA installed a vacuum extraction system under the concrete slab of the billiards club building. Also, a ventilation system was installed.

## RESULTS OF THE REMEDIAL INVESTIGATION

Sampling for the RI was conducted from October 2001 to August 2002. The results of the RI are summarized below.

### Soil

Soils at the Jackson Steel site were sampled at 33 locations. Ten of these locations were situated in unpaved areas (samples at these locations were collected from shallow depths). The remaining 23 sampling locations were situated under the pavement (samples in these areas were collected at various depths extending to the bottom of the Upper Glacial Aquifer).

Although VOCs were found at all ten unpaved sampling locations and all of the 23 soil boring locations, with the exception of the samples collected near the dry wells, all of the concentrations exceeding the New York State Technical and Administrative Guidance Memorandum No. 94-HWR-4046 (TAGM) objectives<sup>1</sup> were found within the top 1 foot of soil. In the shallow soil, TCE and PCE concentrations exceeded the TAGM objective at three locations—soil located near the back door to the building extension and two soil boring locations within the trench in the building. The maximum concentrations of TCE and PCE detected at these three locations were 1,400 and 19,000 micrograms per kilogram (µg/kg), respectively. (The TAGM objectives for TCE and PCE are 700 and 1,400 µg/kg, respectively.) Acetone also exceeded the TAGM objective (200 µg/kg) in shallow soil samples collected within the unpaved soil areas. The maximum detected concentration of acetone was 2,000 µg/kg.

The dry wells are the only locations where VOCs were found in soil at depths greater than one foot. The sampling results for the dry wells suggest that it is possible that workers dumped chemicals containing VOCs into the dry wells. Although some of the VOC concentrations found in the dry wells exceeded their TAGM objectives, the concentrations are much lower in comparison to the concentrations

measured in the dry wells during previous investigations. The VOCs that exceeded the TAGM objectives and their maximum concentrations and TAGM objectives are total xylenes (5,900 µg/kg; TAGM objective 1,200 µg/kg), 1,1-DCA (1,600 µg/kg; TAGM objective 200 µg/kg), and 1,1,1-TCA (1,400 µg/kg; TAGM objective 800 µg/kg). In addition, 1,2-cis-DCE, for which no TAGM value exists, was detected at a maximum concentration of 12,000 µg/kg.

SVOCs, in particular Polynuclear Aromatic Hydrocarbons (PAHs)<sup>2</sup>, were found at many of the sampled locations. PAHs exceeded the TAGM objectives at all ten unpaved soil sampling locations and at seven of the 23 soil boring locations sampled for SVOCs. However, with the exception of the three dry wells and one soil boring, all of the concentrations exceeding the TAGM objective were found within the top one foot of soil bgs. Chrysene was the PAH detected at the highest concentration (5,200 µg/kg; TAGM objective 400 µg/kg), followed by benzo(b)fluoranthene (5,100 µg/kg; TAGM objective 1,100 µg/kg).

PAH contamination in the dry wells appears to be limited to the top several feet of soil in the dry wells. PAHs tend to bind more to soil particles than VOCs. This would limit their vertical leaching and migration through the soil column. Hence their absence at greater depths in the dry wells. It is possible that the PAHs found in the top several feet of soil in the dry wells are the result of sediment washout from the unpaved soil strips to the dry wells. Of note, the same PAHs were found at concentrations exceeding the TAGM objective in all of the soil samples collected from the 0-1 foot bgs depth interval in the unpaved areas of the site from where the sediment may have been washed into the dry wells. Chrysene was the PAH detected at the highest concentration (4,000 µg/kg; TAGM objective 400 µg/kg), followed by benzo(b)fluoranthene (3,600 µg/kg; TAGM objective 1,100 µg/kg).

Pesticides were detected at concentrations above the TAGM objective at seven of the 10 unpaved soil sampling locations. The maximum concentration was measured for alpha chlordane (1,500 µg/kg; TAGM objective 540 µg/kg), followed by gamma chlordane (570 µg/kg; TAGM objective 540 µg/kg). The only location where soil at depth greater than one foot bgs contained pesticide concentrations above the TAGM objective was in one of the dry wells located

<sup>1</sup>

*Division Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels*, Division of Hazardous Waste Remediation, January 24, 1994.

There are currently no federal or state promulgated standards for contaminant levels in soils. There are, however, To-Be-Considereds, one of which is the New York State TAGM objectives, are being used as the soil cleanup levels for this site. TAGM objectives are the more stringent cleanup level between a human-health protection value and a value based on protection of groundwater as specified in the TAGM. All of these levels fall within EPA's acceptable risk range.

<sup>2</sup>

The results for the PAHs should be viewed with caution, as the PAHs may not be associated with Jackson Steel's metal forming operations, but rather with the urban nature of the area where the site is located, the asphalt pavement covering the site, and the solid waste management activities and truck traffic on the property after Jackson Steel ceased its operations. Specifically, PAHs are formed mainly during incomplete combustion processes of organic materials such as wood, coal, mineral oil, and oil-derived products. As such, they are ubiquitous in urban environments and are found in air, soil, water, and food. They are contained in motor-vehicle exhausts both from gasoline and diesel engines and are present in crude and refined oils; in commercial products, such as bitumen (asphalt), coal tars, and pitches; and in industrial wastes such as waste oil.

under the parking area. Two pesticides were found with the maximum concentration measured for gamma chlordane (1,100 µg/kg; TAGM objective 540 µg/kg).

There is no information on whether chemicals containing pesticides were used in facility operations. Pesticide contamination appears to be limited to the parking lot area where operations are known to have taken place in the past. It is possible that the pesticides were applied directly for pest control rather than be the result of the facility's metal-forming operations.

Metal concentrations exceeded the TAGM objectives at all ten unpaved sampling locations and at six of the 23 soil boring locations sampled for metals at the site. These six soil borings are all located within the building. With the exception of the indoor dry well, all of the samples containing concentrations above the TAGM objectives were collected within the top one foot of soil bgs. The concentrations of arsenic, cadmium, copper, lead, mercury, and zinc exceeded the TAGM objectives<sup>3</sup>. Their maximum concentrations and TAGM objectives are as follows: arsenic (62.5 milligrams per kilogram [mg/kg]; TAGM objective 12 mg/kg), cadmium (5.1 mg/kg; TAGM objective 1 mg/kg), copper (257 mg/kg; TAGM objective 50 mg/kg), lead (1,190 mg/kg; TAGM objective 500 mg/kg), mercury (0.8 mg/kg; TAGM objective 0.2 mg/kg), and zinc (887 mg/kg; TAGM objective 50 mg/kg).

Finally, several contaminants (including acetone, SVOCs and metals) were detected in the three building sumps at concentrations exceeding the TAGM objectives.

## Groundwater

Sampling results for the shallow Upper Glacial Aquifer indicate that chemicals that may have been discharged into the dry wells during the active life of the facility have resulted in the contamination of the shallow Upper Glacial Aquifer at the site. Specifically, the highest total VOC concentrations were measured in the monitoring wells located immediately downgradient of the two dry wells located under the parking area. These monitoring wells also contained a higher number of VOCs exceeding the Maximum Contaminant

Levels (MCLs)<sup>4</sup> in comparison to the remaining monitoring wells. VOCs were also found at the middle of the Upper Glacial Aquifer at the site, though the concentrations were lower than those measured in the shallow aquifer at this location. The following VOCs exceeded their MCLs in the shallow and middle Upper Glacial Aquifer at the site: 1,1-DCA; cis-1,2-DCE; PCE; 1,1,1-TCA; and TCE.

Four VOCs, cis-1,2-DCE, methyl tertiary butyl ether (MTBE), toluene, and TCE, were detected in the shallow and middle Upper Glacial Aquifer upgradient of the site compared to a total of thirteen VOCs detected in the groundwater in the area of the dry wells at the site (1,1-DCA, cis- and trans-1,2-DCE, 1,1,1-TCA, TCE, PCE, benzene, chloroethane, cyclohexane, ethylbenzene, isopropylbenzene, MTBE, and toluene). All upgradient concentrations were below MCLs and the concentrations of two of the four VOCs, cis-1,2-DCE and TCE, were orders of magnitude (*i.e.* ten to one thousand times) lower at the upgradient location than at the site. From the thirteen VOCs detected at the site, four exceeded their MCLs (1,1-DCA, cis 1,2-DCE, PCE, and TCE). The compound detected at the highest concentration was cis-1,2-DCE at 340 micrograms per liter (µg/l), followed by PCE (63 µg/l). (The MCLs for cis-1,2-DCE and PCE are both 5 µg/l.) These results suggest limited upgradient contributions to the VOC concentrations detected at the site. Downgradient of the site, only two VOCs, MTBE and toluene (these compounds were also found upgradient of the site), were found in the shallow and middle Upper Glacial Aquifer<sup>5</sup>. The concentrations were below the MCLs.

The sampling results for the base of the Upper Glacial Aquifer indicated a decrease in the VOC concentrations with depth upgradient of the site, underlying the site, and downgradient of the site. None of the VOCs detected at the base of the Upper Glacial Aquifer exceeded its MCL. The compound detected at the highest concentration at the base of the Upper Glacial Aquifer was TCE at 2.5 µg/l, followed by PCE at 1.4 µg/l. (The MCLs for both compounds is 5 µg/l.)

VOCs were also detected in the lower, Magothy Aquifer. TCE and PCE exceeded the MCLs at a number of sampling points in this aquifer at depths between approximately 400 and 450 feet. The compound detected at the highest

<sup>3</sup> Metals occur naturally in the environment. The TAGM objective to which the on-site metal concentrations were compared are based on the concentrations at which metals are known to occur naturally in soil in the eastern United States. Copper, cadmium, chromium, nickel, lead, and zinc are also known to be associated with iron and steel works operations and metal finishing. Therefore, while some of the metals found in on-site soil may be naturally occurring, others may be the result of past site operations. As noted, more exceedances of the TAGM objective and higher metal concentrations, in general, were noted in the dry well located within the building. It is possible that during the active life of the facility, the floor of the building was washed and the water drained to this dry well, resulting in the metals found in the sediments in the dry well.

<sup>4</sup> EPA and New York State Department of Health have promulgated health-based protective MCLs, which are enforceable standards for various drinking water contaminants. MCLs ensure that drinking water does not pose either a short- or long-term health risk.

<sup>5</sup> Of note, in addition to the occurrence of VOCs that are likely related to Jackson Steel's metal forming operations, several VOCs (MTBE, benzene, toluene, ethylbenzene, xylene and isopropylbenzene) were detected that are typically related to gasoline and fuel contamination. This contamination could be attributed to site activities after Jackson Steel ceased operations, when the site was used for illegal solid waste management. The presence of MTBE and toluene in the upgradient monitoring well would also suggest some upgradient contribution to this contamination.

## WHAT IS RISK AND HOW IS IT CALCULATED?

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

**Hazard Identification:** In this step, the COCs at the site in various media (*i.e.*, soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

**Exposure Assessment:** In this step, the different exposure pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil. Factors relating to the exposure assessment include, but are not limited to, the concentrations that people might be exposed to and the potential frequency and duration of exposure. Using these factors, a “reasonable maximum exposure” scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

**Toxicity Assessment:** In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure and severity of adverse effects are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health effects, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health effects.

**Risk Characterization:** This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a  $10^{-4}$  cancer risk means a “one-in-ten-thousand excess cancer risk”; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions explained in the Exposure Assessment. Current Superfund guidelines for acceptable exposures are an individual lifetime excess cancer risk in the range of  $10^{-4}$  to  $10^{-6}$  (corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk) with  $10^{-6}$  being the point of departure. For non-cancer health effects, a “hazard index” (HI) is calculated. An HI represents the sum of the individual exposure levels compared to their corresponding reference doses. The key concept for a non-cancer HI is that a “threshold level” (measured as an HI of less than 1) exists below which non-cancer health effects are not expected to occur.

concentration in the Magothy Aquifer was TCE (200 µg/l), followed by PCE (86 µg/l). (The MCLs for both compounds is 5 µg/l.) The highest concentrations of PCE and of TCE were detected at 454 feet. Degradation products of PCE and TCE (cis-1,2-DCE and 1,1-DCE) were also detected at depth but at very low concentrations (less than 3 µg/l).

The PCE and TCE concentrations detected in the 300 foot-deep silt and clay confining layer separating the upper from the lower aquifers were significantly lower than the concentrations detected at the top of the Upper Glacial Aquifer or the bottom of the sampled interval (404 to 454 feet below ground surface) of the Magothy Aquifer. Specifically, the PCE concentrations in the confining layer ranged from 2.7 to 13 µg/kg and the TCE concentrations ranged from 5.9 to 32 µg/kg. In addition, the concentrations of cis 1,2-DCE, which was detected at 340 µg/kg at the top of the Upper Glacial Aquifer, ranged from 0.26 to 1 µg/kg.

These sampling results suggest that the VOC contamination in the groundwater in the upper aquifer and in the confining layer is a direct result of contamination migrating vertically downward from the site.

SVOCs were detected in four of the five wells monitoring the shallow Upper Glacial Aquifer. There is no information on the use of SVOCs in facility operations. As was noted above, SVOCs are common in urban environments. For compounds with established MCLs, the detected concentrations were below the corresponding MCLs.

Pesticides were detected in all of the monitoring wells in the Upper Glacial Aquifer. Metals were detected in all of the wells located in the Upper Glacial Aquifer. The metals arsenic, iron, and manganese were detected at concentrations exceeding the federal and state MCLs. The maximum concentrations of these metals and their MCLs are arsenic at 13.5 µg/l (MCL is 10 µg/l), iron at 66,100 µg/l (MCL is 300 µg/l), and manganese at 7,070 µg/l (MCL is 300 µg/l). The following metals are known to be associated with iron and steel works operations and metal finishing: copper, cadmium, chromium, nickel, lead, and zinc. While some of these metals were found in shallow soil above the TAGM objectives—possibly indicating their occurrence as a result of site operations—none of these metals with established MCLs were detected above their MCLs in the groundwater samples from the Upper Glacial Aquifer.

## Building Floor

Building floor wipe samples contained several SVOCs, pesticides, and metals. The pesticides may be the result of their application for the purpose of pest control in the building. The SVOC measured at the highest concentration was bis (2-ethylhexyl) phthalate at 5.6 µg/wipe, followed by di-n-butylphthalate at 2.9 µg/wipe. The pesticide measured at the highest concentration was 4,4-DDE (600 µg/wipe), followed by 4,4-DDD (190 µg/wipe).



## Soil Gas and Indoor Air Sampling

EPA conducted an investigation in an attempt to determine the source of the PCE in the former daycare center located immediately south of the site. The investigation included the collection of soil gas samples at numerous locations inside and outside the former daycare building, and several rounds of indoor air sampling at the former daycare center and nearby business and residential buildings<sup>6</sup>.

The results of soil gas surveys indicated the presence of PCE, TCE, 1,1,1-TCA, cis-1,2-DCE, and 1,1-DCA in soil gas at the site, with the highest concentrations being located in the area around the former dry wells. TCE and PCE were detected at lower concentrations underneath the billiards parlor located adjacent to the site and the daycare center buildings.

PCE, TCE, and other VOCs were detected in air samples. In general, higher concentrations of chlorinated solvents were measured in the air samples collected in the daycare building when the ventilation systems (building and subslab) were not operational. The types of compounds found at higher concentrations varied when the ventilation systems were switched on and off. Some contaminants such as toluene were detected at higher concentrations when the ventilation systems were on. This might imply that there is an external air pollution source.

Although VOCs were found in soils at the Jackson Steel site, the contaminants, their concentrations, and locations are not consistent with the elevated VOC concentrations found in the soil gas and air samples.

## SUMMARY OF SITE RISKS

Based upon the results of the RI, a baseline risk assessment was conducted to estimate the risks associated with current and future property conditions. A baseline risk assessment is an analysis of the potential adverse human health effects caused by hazardous-substance exposure in the absence of any actions to control or mitigate these under current and future land uses.

The human-health estimates summarized below are based on current reasonable maximum exposure scenarios and were developed by taking into account various conservative estimates about the frequency and duration of an individual's exposure to the COCs, as well as the toxicity of these contaminants.

While a screening of ecological considerations lead to the conclusion that property conditions do not necessitate a quantitative ecological risk assessment, a qualitative discussion is included below.

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<sup>6</sup> The investigation also included the collection of deep soil samples from the parking lot located between the Jackson Steel site and the former daycare center. See the discussion in the "Soils" section, above.

## Human Health Risk Assessment

As was noted above, the current land use of the property is industrial/commercial, and it is anticipated that the land use will not change in the future.

The baseline risk assessment began with selecting COCs in the various media that would be representative of site risks. Since the area is served by municipal water, it is not likely that the groundwater underlying the property will be used for potable purposes in the foreseeable future; however, since regional groundwater is designated as a drinking water source, potential exposure to groundwater was evaluated. The other media that were evaluated included surface and subsurface soil and soil gas.

COCs in the groundwater include benzene, arsenic, PCE, TCE, vinyl chloride, and heptachlor. COCs in the surface soil include PAHs, dieldrin, heptachlor epoxide, PCE, and TCE. COCs in the subsurface soil include PAHs, arsenic, dieldrin, TCE, and PCE. COCs in the dust on the building floor include arsenic and chromium.

The baseline risk assessment evaluated the health effects which could result from exposure to contaminated media through ingestion, dermal contact, or inhalation. Since the site is zoned for industrial/commercial use, the risk assessment evaluated current and future hazards and risks to trespassers and industrial/commercial workers.

The results of the baseline risk assessment indicate that in its current condition, the site does not present hazards or increased cancer risks to trespassers. Specifically, under current-use trespassing scenario, the HI is less than 1 and the cancer risk is  $4 \times 10^{-6}$  which is within EPA's acceptable risk range.

The unremediated site may present hazards and increased cancer risks under potential future industrial and commercial use scenarios. Under a future industrial or commercial use scenario, the hazards and cancer risks would be associated with ingestion of dust from and dermal contact with the building floor; ingestion, dermal contact and inhalation of particles of surface soil; and ingestion, dermal contact, and inhalation of vapors from the groundwater in both the Upper Glacial and the Magothy aquifers (if the groundwater is extracted using a well). The risks would be to future utility and construction workers outside of the building and future industrial/commercial workers within or outside of the building.

The total estimated HI value for exposures to the selected COCs in surface soil and groundwater in the Upper Glacial and Magothy aquifers via ingestion, dermal contact and inhalation was 30 for a future indoor industrial/commercial worker and 23 for a future outdoor industrial/commercial worker. These hazards are above EPA's guidelines for acceptable exposures (HI less than 1) and are mainly associated with the groundwater in the Upper Glacial and Magothy aquifers. The estimated HI value for exposure to building floor contaminants via ingestion and dermal contact was 5.6 for a future indoor industrial/commercial worker,



which exceeds EPA's guidelines for acceptable exposures mentioned above.

The total estimated cancer risk for exposures to the selected COCs in surface soil and groundwater in the Upper Glacial and Magothy aquifers via ingestion, dermal contact and inhalation was  $7.9 \times 10^{-3}$  for a future indoor industrial/commercial worker and  $7.3 \times 10^{-3}$  for a future outdoor industrial/commercial worker. These cancer risks are above EPA's guidelines for acceptable exposures ( $1 \times 10^{-4}$ ) and are mainly associated with the groundwater in the Upper Glacial and Magothy aquifers.

### **Ecological Risk Assessment**

Information from the NYSDEC Bureau of Wildlife indicates that there are no endangered or threatened plant or animal species at or in the vicinity of the site. Therefore, EPA evaluated potential exposure pathways for non-endangered and non-threatened animal and plant species. Since the property includes a mostly paved industrial/commercial facility, there is minimal habitat available for ecological receptors on the property. Due to the suburban/commercial setting, the potential for exposure to receptors and ecological risk is minimal in the area surrounding the property as well.

Because the main medium of concern is groundwater, and the depth to the surface of the groundwater is approximately fifty feet bgs, direct contact with groundwater by ecological receptors is unlikely. Because there are no wetlands or surface water bodies on or in the immediate vicinity of the site, there is no potential for contaminated groundwater to discharge into surface water. Therefore, groundwater is not considered to be an exposure pathway for ecological receptors.

Soil samples did contain VOCs, some of which are present in concentrations greater than conservative screening criteria considered protective of soil invertebrate species. Therefore, there is a potential for an unacceptable risk to burrowing animals that may come into contact with these contaminated surface soils (zero to two-foot depth).

### **Summary of Human Health and Ecological Risks**

The results of the risk assessment indicate that the site may present an unacceptable non-cancer hazard and an increased cancer risk to a future adult inside industrial worker and future adult outside industrial worker. The risks are mainly associated with exposures to groundwater in the Upper Glacial and Magothy aquifers. Also, a worker exposed to dust from the building floor represents an unacceptable cancer risk and non-cancer HI.

Contamination in the surface soil poses a potential unacceptable risk to burrowing animals that may come into contact with these soils.

Based upon the results of the RI and the risk assessment, EPA has determined that actual or threatened releases of hazardous substances from the property, if not addressed by

the preferred remedy or one of the other active measures considered, may present a current or potential threat to human health and the environment.

### **REMEDIAL ACTION OBJECTIVES**

Remedial action objectives are specific goals to protect human health and the environment. These objectives are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), to-be-considered guidance, and site-specific risk-based levels.

The following remedial action objectives were established for the site:

- Minimize or eliminate contaminant migration from contaminated soils and dry wells to the groundwater;
- Minimize or eliminate any contaminant migration from contaminated soils and groundwater to indoor air;
- Restore groundwater to levels which meet state and federal standards within a reasonable time frame;
- Mitigate the migration of the affected groundwater; and
- Reduce or eliminate any direct contact, ingestion, or inhalation threat associated with contaminated soils, soil vapor, contaminated surfaces in the on-site building, and groundwater.

Soil cleanup objectives will be those established pursuant to the TAGM guidelines. These levels are the more stringent cleanup level between a human-health protection value and a value based on protection of groundwater as specified in the TAGM. All of these levels fall within EPA's acceptable risk range.

Groundwater cleanup goals will be the more stringent of the state or federal promulgated standards.

### **SUMMARY OF REMEDIAL ALTERNATIVES**

CERCLA §121(b)(1), 42 U.S.C. §9621(b)(1), mandates that remedial actions must be protective of human health and the environment, cost-effective, comply with ARARS, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ, as a principal element, treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants and contaminants at a site. CERCLA §121(d), 42 U.S.C. §9621(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants, which at least

attains ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA §121(d)(4), 42 U.S.C. §9621(d)(4).

Detailed descriptions of the remedial alternatives for addressing the contamination associated with the site can be found in the FS report. This document presents five soil remediation alternatives, seven groundwater remediation alternatives, and three building floor alternatives. To facilitate the presentation and evaluation of these alternatives, the FS report alternatives were reorganized to formulate the remedial alternatives discussed below.

It should be noted that although the FS report evaluated chemical oxidation for the lower aquifer, this technology is not being considered for the lower aquifer in this Proposed Plan because of the uncertainties regarding the application of this technology to the depths requiring groundwater remediation at the site (down to 450 feet). Similarly, although the FS report evaluated bioremediation, this technology is not considered for either aquifer because of the uncertainties regarding favorable microbial conditions at the site.

The construction time for each alternative reflects only the time required to construct or implement the remedy and does not include the time required to design the remedy, negotiate the performance of the remedy with any PRPs, or procure contracts for design and construction.

The remedial alternatives are:

#### **Source Control Alternatives**

##### **Alternative SC-1: No Action**

Capital Cost:	\$0
Annual Operation and Maintenance Cost:	\$0
Present-Worth Cost:	\$0
Construction Time:	0 months

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison with the other alternatives. The no-action remedial alternative for soil does not include any physical remedial measures that address the problem of soil contamination at the property.

Because this alternative would result in contaminants remaining on-property above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the site be reviewed at least once every five years. If justified by the review, remedial actions may be implemented to remove, treat, or contain the contaminated soils.

##### **Alternative SC-2: Excavation of Contaminated Soils, Building Trench, Sumps, and Contents of Dry Wells; Off-Site Treatment and/or Disposal; and Building Decontamination**

Capital Cost:	\$5,299,000
Annual Operation and Maintenance Cost:	0
Present-Worth Cost:	\$5,299,000
Construction Time:	6 months

This remedial alternative includes the excavation of all source-area soils down to the watertable, the trench and sumps inside the building, the drywells, and off-site treatment and/or disposal. In addition, the building floor would be decontaminated through vacuuming and power washing. All vacuumed dust and wash water would be transported for treatment and/or disposal at an off-site Resource Conservation and Recovery Act (RCRA)-compliant facility.

The estimated volume of contaminated soil to be excavated is 32,500 cubic yards (contamination is as deep as 50 feet). The actual extent of the excavation and the volume of the excavated material would be based on post-excavation confirmatory sampling. Shoring of the excavation and extraction and treatment of any water that enters the excavation in the source area would be necessary.

The excavated areas would be backfilled with clean fill and the previously paved areas would be re-paved. All excavated material would be characterized and transported for treatment and/or disposal at an off-site RCRA-compliant facility.

##### **Alternative SC-3: Excavation of Contaminated Surface Soils, Building Trench, Sumps, and Contents of Dry Wells; Off-Site Treatment and/or Disposal; Treatment of VOC-Contaminated Subsurface Soils Using ISVE; and Building Decontamination**

Capital Cost:	\$1,008,000
Annual Operation and Maintenance Cost:	\$824,000
Present-Worth Cost:	\$2,383,000
Construction Time:	6 months

This alternative includes the excavation of all VOC-, SVOC-, and metal-contaminated surface soils which exceed the TAGM objectives, the trench and sumps inside the building, and the drywells. In addition, the building floor would be decontaminated as in Alternative SC-2.

The estimated volume of contaminated soil to be excavated is 270 cubic yards. Excavation of the surface soil, sumps, and building trench would be to approximately two feet. The actual extent of the excavation and the volume of the

excavated material would be based on post-excavation confirmatory sampling.

Under this alternative, the VOC-contaminated soils would be remediated by ISVE. Under this treatment process, air would be forced through a series of wells to volatilize the solvents contaminating the soils in the unsaturated zone (above the water table). The extracted vapors would be treated by granular activated carbon and/or other appropriate technologies before being vented to the atmosphere. The exact configuration and number of vacuum extraction wells would be determined during the remedial design.

While the actual period of operation of the ISVE system would be based upon soil sampling results which demonstrate that the affected soils have been treated to soil TAGM objectives and indoor air VOC levels in the adjacent affected buildings have been reduced to acceptable health levels with the subslab vacuum extraction system turned off, it is estimated that the system would operate for a period of two years. Should the former daycare center or former billiards parlor buildings be occupied during the course of the remediation, monitoring to assure that no unacceptable vapor exposure takes place would be instituted, and the ventilation system installed during the RI would be appropriately maintained.

The excavated areas would be backfilled with clean fill and the previously paved areas would be re-paved. All excavated material would be characterized and transported for treatment and/or disposal at an off-site RCRA-compliant facility.

### **Groundwater Remedial Alternatives**

#### **Alternative GW-1: No Action**

Capital Cost:	\$0
Annual Monitoring Operation and Maintenance Cost:	\$0
Present-Worth Cost:	\$0
Construction Time:	0 months

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison with the other alternatives. The no-action remedial alternative would not include any physical remedial measures to address the groundwater contamination at the site.

Based on groundwater modeling, it has been estimated that it would take 12 years for the groundwater in the upper and lower aquifers to be restored to drinking water quality through dispersion, dilution and volatilization.

Because this alternative would result in contaminants remaining on-site above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the site

be reviewed at least once every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

#### **Alternative GW-2: Groundwater Extraction and Treatment for Upper and Lower Aquifers**

Capital Cost:	\$2,476,000- \$3,029,000
Annual Operation, Maintenance, and Monitoring Cost:	\$682,000- \$727,000
Present-Worth Cost:	\$6,387,000- \$6,652,000
Construction Time:	6 months

Under this alternative, four groundwater extraction wells would be installed in the Upper Glacial Aquifer in the source area. In consultation with NYSDEC, the extent of the off-site groundwater contamination and its potential impact on the public water supply wells would be determined during the remedial design phase. Based on the evaluation of off-site groundwater data that would be collected, if it is determined that site-related contamination is affecting the aquifers, this alternative would be expanded, as necessary, to include the off-site groundwater contamination and its potential impacts on the public water supply wells.

The extracted water would be treated at an on-site facility by air stripping, carbon adsorption, and methods appropriate for the treatment of metals. The treated water would be reinjected into the aquifer.

Air stripping involves pumping untreated groundwater to the top of a "packed" column, which contains a specified amount of inert packing material. The column receives ambient air under pressure in an upward direction from the bottom of the column as the water flows downward, transferring VOCs to the air phase. The air-stripping process would be followed by a groundwater polishing system using granular activated carbon and/or other appropriate technologies. To comply with New York State air guidelines, granular activated carbon treatment of the air strippers' air exhaust streams may be necessary.

In consultation with NYSDEC, the extent of the off-site groundwater contamination and its potential impact on the public water supply wells would be determined during the remedial design phase. Based on the evaluation of off-site groundwater data that would be collected, if it is determined that site-related contamination is affecting the aquifer, this alternative would be expanded, as necessary, to include the off-site groundwater contamination and its potential impacts on the public water supply wells. Because this alternative would result in contaminants remaining on-site above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the site be reviewed at least once every five years.

### Alternative GW-3: In-Situ Chemical Oxidation for Treatment of Upper Aquifer and Groundwater Extraction and Treatment for Lower Aquifer

Capital Cost:	\$1,750,000- \$2,303,000
Annual Operation, Maintenance and Monitoring Cost:	\$413,000- \$458,000
Present-Worth Cost:	\$4,159,000- \$4,425,000
Construction Time:	6 months

This alternative is the same as Alternative GW-2, except instead of extracting contaminated groundwater from the Upper Glacial Aquifer, an oxidizing agent<sup>7</sup>, such as potassium permanganate (KMnO<sub>4</sub>) or hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>), would be injected via approximately 12 wells installed in the Upper Glacial Aquifer in the source area. Under this process, the oxidizing agent would chemically transform the VOCs into less toxic compounds or to carbon dioxide, and water. Bench- and pilot-scale treatability studies would be performed to optimize the effectiveness of the injection system and to determine optimum oxidant delivery rates and locations for the injection-well points.

Based on the evaluation of off-site groundwater data that would be collected, if it is determined that site-related contamination is affecting the aquifer, this alternative would be expanded, as necessary, to include the off-site groundwater contamination and its potential impacts on the public water supply wells.

Because this alternative would result in contaminants remaining on-site above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the site be reviewed at least once every five years.

### Alternative GW-4: In-Situ Air Sparging for Treatment of Upper Aquifer and Groundwater Extraction and Treatment for Lower Aquifer

Capital Cost:	\$1,189,000- \$1,742,000
Annual Operation, Maintenance, and Monitoring Cost:	\$673,500- \$718,500
Present-Worth Cost:	\$4,168,000- \$4,433,000
Construction Time:	6 months

This alternative is the same as Alternative GW-2, except instead of extracting contaminated groundwater from the Upper Glacial Aquifer, it would be treated with air sparging.

Air sparging involves injecting air, under pressure, into the aquifer via injection wells. Under this process, bubbles are

formed from the injected and air, which strip the VOCs from the groundwater. A vapor extraction system would be used to remove the generated vapors.

Based on the evaluation of off-site groundwater data that would be collected, if it is determined that site-related contamination is affecting the aquifer, this alternative would be expanded, as necessary, to include the off-site groundwater contamination and its potential impacts on the public water supply wells.

Based on groundwater modeling, it has been estimated that it would take two years to remediate the upper aquifer and eight years for the groundwater in the lower aquifer to be restored to drinking water quality (six years if both on-site and off-site groundwater extraction wells are used) under this alternative.

Because this alternative would result in contaminants remaining on-site above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the site be reviewed at least once every five years.

### COMPARATIVE ANALYSIS OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative is assessed against nine evaluation criteria, namely, overall protection of human health and the environment, compliance with applicable or relevant and appropriate requirements, long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, short-term effectiveness, implementability, cost, and state and community acceptance.

The evaluation criteria are described below.

- Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each exposure pathway (based on a reasonable maximum exposure scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.
- Compliance with ARARs addresses whether or not a remedy would meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and requirements or provide grounds for invoking a waiver.
- Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.
- Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies, with respect to these parameters, a remedy may employ.

<sup>7</sup>

An oxidizing agent uses oxygen to degrade VOCs.

- Short-term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.
- Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.
- Cost includes estimated capital and operation and maintenance costs, and net present-worth costs.
- State acceptance indicates if, based on its review of the RI/FS and Proposed Plan, the state concurs with the preferred remedy at the present time.
- Community acceptance will be assessed in the ROD and refers to the public's general response to the alternatives described in the Proposed Plan and the RI/FS reports.

A comparative analysis of these alternatives based upon the evaluation criteria noted above follows.

#### Overall Protection of Human Health and the Environment

Alternative SC-1 (no action) would not be protective of human health and the environment, since it would not actively address the contaminated soils, which present unacceptable risks of exposure and are a source of groundwater contamination. Alternative SC-2 (excavation of contaminated soils down to the watertable, contents of the dry wells, and trench, and off-site treatment/disposal), and Alternative SC-3 (excavation of contaminated surface soils, contents of the dry wells, and trench, and off-site treatment/disposal, and ISVE for subsurface contaminated soils) would be protective of human health and the environment, since each alternative relies upon a remedial strategy and/or treatment technology capable of eliminating human exposure and removing the source of groundwater contamination in the unsaturated zone. Under these alternatives, the contaminants would either be treated on-property or treated/disposed of off-site.

Alternative GW-1 (no action) would be the least protective groundwater alternative in that it would result in no active measures to restore groundwater quality to drinking water standards. Based on hydrogeological modeling presented in Appendix G of the FS report, the contaminant mass is projected to decrease over time, as contaminated groundwater migrates. Under this alternative, the restoration of the groundwater would take a longer time (an estimated 12 years) in comparison to the other alternatives. All three of the active groundwater alternatives are estimated to restore groundwater quality in the lower aquifer in 8 years and, therefore, would be protective of human health and the environment. The restoration of the upper aquifer, which is more likely to affect soil vapor content of the overlying soils, is achieved at distinct time frames for the three groundwater treatment alternatives. Specifically, for Alternative GW-3 (in-situ chemical oxidation for treatment of upper aquifer and groundwater extraction and treatment for lower aquifer), the upper aquifer is anticipated to be cleaned

in one month. This time-frame is much faster than for Alternative GW-3 (groundwater extraction and treatment for upper and lower aquifers) and Alternative GW-4 (in-situ air sparging for treatment of upper aquifer and groundwater extraction and treatment for lower aquifer) for which the cleanup time-frames are five and two years respectively. Therefore, in terms of reducing soil vapors emanating from the upper aquifer, Alternative GW-3 would be the most protective of human health and the environment.

#### Compliance with ARARs

There are currently no federal or state promulgated standards for contaminant levels in soils, only New York State soil cleanup objectives as specified in the soil TAGM (which are used as "To-Be-Considered" criteria).

Since the contaminated soils would not be addressed under Alternative SC-1 (no action), this alternative would not comply with the soil cleanup objectives. Alternative SC-2 (excavation of contaminated soils down to the watertable, contents of the dry wells, sumps, and trench, and off-site treatment/disposal), and Alternative SC-3 (excavation of contaminated surface soils, contents of the dry wells, sumps, and trench, and off-site treatment/disposal, and ISVE for subsurface contaminated soils) would attain the soil cleanup objectives specified in the TAGM.

Alternative SC-2 and Alternative SC-3 would be subject to New York State and federal regulations related to the transportation and off-site treatment/disposal of wastes. Alternatives SC-2 and SC-3 would involve the excavation of contaminated soils and would, therefore, require compliance with fugitive dust and VOC emission regulations. In the case of Alternative SC-3, compliance with air emission standards would be required for the ISVE system, as well. Specifically, treatment of off-gases would have to meet the substantive requirements of New York State Regulations for Prevention and Control of Air Contamination and Air Pollution (6 NYCRR Part 200 *et seq.*) and comply with the substantive requirements of other state and federal air emission standards.

EPA and NYSDOH have promulgated health-based protective MCLs (40 CFR Part 141, and 10 NYCRR, Chapter 1), which are enforceable standards for various drinking water contaminants (chemical-specific ARARs). The aquifer is classified as Class GA (6 NYCRR 701.18), meaning that it is designated as a potable water supply. Although the groundwater at the site is not presently being utilized as a potable water source, achieving MCLs in the groundwater is an applicable standard, because area groundwater is a source of drinking water.

Alternative GW-1 does not provide for any direct remediation of the groundwater and would, therefore, involve no actions to achieve chemical-specific ARARs. All three of the active groundwater alternatives would be effective in reducing groundwater contaminant concentrations to below MCLs.

Any emissions from the air stripper under Alternatives GW-2, GW-3, and GW-4 would be required to comply with the substantive requirements of state and federal air emission standards.

### Long-Term Effectiveness and Permanence

Alternative SC-1 would involve no active remedial measures and, therefore, would not be effective in eliminating the potential exposure to contaminants in soil and would allow the continued migration of contaminants from the soil to the groundwater. Alternative SC-2 and Alternative SC-3 would both be effective in the long term and would provide permanent remediation by either removing the contaminated soils from the site or treating them on-site.

Alternative SC-3 would generate treatment residuals which would have to be appropriately handled.

Alternative GW-1 would be the least effective in the long term in restoring groundwater quality, since it would take an estimated 12 years to restore groundwater. Alternatives GW-2, GW-3, and GW-4 would effectively restore groundwater quality in an estimated eight years (six years if both on-site and off-site groundwater extraction wells are used).

Alternatives GW-2, GW-3, and GW-4 may generate treatment residuals which would have to be appropriately handled.

### Reduction in Toxicity, Mobility, or Volume Through Treatment

Alternative SC-1 would provide no reduction in toxicity, mobility or volume. Under Alternative SC-2, the toxicity, mobility, and volume of the contaminants would be eliminated by removing the contaminated soil from the property for treatment/disposal. Under Alternative SC-3 the toxicity, mobility, and volume of contaminants would be reduced or eliminated through on-site treatment and by removing the contaminated soil from the property for treatment/disposal.

Alternative GW-1 would not effectively reduce the toxicity, mobility, or volume of contaminants in the groundwater, as this alternative involves no active remedial measures. Alternatives GW-2, GW-3, and GW-4 would reduce the toxicity, mobility, or volume of contaminants in the groundwater through treatment at the source, thereby satisfying CERCLA's preference for treatment.

### Short-Term Effectiveness

Alternative SC-1 does not include any physical construction measures in any areas of contamination and, therefore, would not present any potential adverse impacts to on-property workers or the community as a result of its implementation. Alternatives SC-2 and SC-3 could present some limited adverse impacts to on-site workers through dermal contact and inhalation related to excavation activities. Alternative SC-3 could also result in some adverse impacts to on-site workers through dermal contact and inhalation related to the installation of ISVE wells through contaminated soils. Noise from the excavation work and from the treatment unit associated with Alternatives SC-2 and SC-3 could present some limited adverse impacts to on-site workers and nearby residents. In addition, interim and post-remediation soil sampling activities would pose some risk. The risks to on-site workers and nearby residents under all of the alternatives could, however, be mitigated by following appropriate health and safety

protocols, by exercising sound engineering practices, and by utilizing proper protective equipment.

Alternative SC-2 would require the off-site transport of a significant volume of contaminated soil, which may pose the potential for traffic accidents, which in turn could result in releases of hazardous substances. Alternative SC-3 would also require the off-site transport of contaminated soil, but at a volume substantially less than Alternative SC-2.

Under Alternative SC-2, substantial disturbance of the land during excavation activities could affect the surface water hydrology of the property. For Alternatives SC-2 and SC-3, there is a potential for increased stormwater runoff and erosion during excavation and construction activities that would have to be properly managed to prevent or minimize any adverse impacts. For these alternatives, appropriate measures would have to be taken during excavation activities to prevent transport of fugitive dust and exposure of workers and downgradient receptors to VOCs.

Since no actions would be performed under Alternative SC-1, there would be no implementation time. It is estimated that it would take six months to excavate and transport the contaminated soils, contents of the dry wells, and trench contents to an EPA-approved treatment/disposal facility under Alternative SC-2. It is estimated that Alternative SC-3 would require six months to excavate and transport the contaminated surface soils, contents of the dry wells, sumps, and trench to an EPA-approved treatment/disposal facility and to install the ISVE system and two years to achieve the soil cleanup objectives.

All of the action groundwater alternatives could present some limited adverse short-term impacts to on-site workers through dermal contact and inhalation related to groundwater sampling activities. Alternative GW-2, Alternative GW-3, and Alternative GW-4 could present adverse impacts to on-site workers, since these alternatives would involve the installation of groundwater extraction, air sparging, and/or oxidation agent injection wells through potentially contaminated soils and groundwater. Alternative GW-3 could pose more adverse impacts than Alternatives GW-2 and GW-4, since it would require the installation of significantly more well points than Alternatives GW-2 and GW-4. Noise from the treatment units associated with Alternatives GW-2, GW-3, and GW-4 could present some limited adverse impacts to on-site workers and nearby residents. The risks to on-site workers and nearby residents under all of the alternatives could, however, be minimized by following appropriate health and safety protocols, by exercising sound engineering practices, and by utilizing proper protective equipment.

Since no activities would be performed under Alternative GW-1, no time would be required to implement this alternative. It is estimated that the groundwater remediation systems under Alternative GW-2, Alternative GW-3, and Alternative GW-4 would be constructed in six months.

Based on groundwater modeling, it has been estimated that it would take 12 years for the groundwater in the upper and lower aquifers to be restored to drinking water quality through dispersion, dilution and volatilization under Alternative GW-1. Alternatives GW-2, GW-3, and GW-4,

with similar configurations with respect to the lower aquifer, would all require approximately eight years to remediate the lower aquifer (six years if both on-site and off-site groundwater extraction wells are used). With varying technologies, Alternatives GW-2, GW-3, and GW-4 would require an estimated 5 years, 1 month, and two years, respectively, to remediate the upper aquifer. The actual time for the groundwater to be remediated under all of the alternatives may vary and may need to be refined based on the results of groundwater monitoring and, as appropriate, groundwater modeling.

#### Implementability

Alternative SC-1 would be the easiest to implement, as there are no activities to undertake. Potentially difficult factors related to the excavation of soils down to fifty feet bgs adjacent to the on-site building and on a property that is so small may need to be resolved for Alternative SC-2. Alternative SC-3 would be much easier to implement than Alternative SC-2, since large-scale soil excavation and handling would not be required. Also, because of space limitations, staging the excavated soil for off-site treatment/disposal under Alternative SC-2 may prove difficult.

Both soil action alternatives would employ technologies known to be reliable and that can be readily implemented. In addition, equipment, services, and materials needed for these alternatives are readily available, and the actions under these alternatives would be administratively feasible. Sufficient facilities are available for the treatment/disposal of the excavated materials under Alternatives SC-2 and SC-3.

Under Alternatives SC-2 and SC-3, determining the extent of the excavation could be easily accomplished through post-excavation soil sampling and analysis. Monitoring the effectiveness of the ISVE system under Alternative SC-3 would be easily accomplished through soil and soil-vapor sampling and analysis.

Alternative GW-1 would be the easiest to implement, since it would not entail the performance of any activities. The in-situ chemical oxidation and the air sparging systems for the upper aquifer under Alternative GW-3, and GW-4, respectively, and groundwater extraction and treatment systems under Alternatives GW-2, GW-3, and GW-4 would be relatively easy to implement. For Alternative GW-3, the oxidant application rate and the rate of the oxidation reaction would need to be carefully monitored and adjusted, as needed, during implementation to ensure that the oxidants do not reach the municipal water supply wells and that the amount of heat and gases generated during the application of the oxidants are properly controlled.

Air sparging, as a general rule, is only effective to a depth of fifty feet below the water table. At the site, the saturated thickness of the upper aquifer plume is more than one hundred feet. Consequently, bench- and pilot-scale treatability studies would be required to verify its effectiveness. Bench and pilot-scale treatability studies would also be required to verify the effectiveness of the in-situ chemical oxidation system.

The groundwater extraction and treatment system that would be used under all three treatment alternatives has been implemented successfully at numerous sites to extract, treat, and hydraulically control contaminated groundwater. Extracting contaminated groundwater from the lower aquifer in off-site areas would, however, be more difficult to implement than extracting contaminated groundwater from the lower aquifer in on-site areas. While there is sufficient space on the property for most of the constructed components of each of the active groundwater alternatives, if off-site groundwater extraction and treatment were required, it would necessitate the installation of piping and other components in the street right-of-way, potentially complicated by the presence of utilities; it would also affect traffic during construction.

The air stripping and granular activated carbon technologies that would be used for groundwater treatment in all three alternatives are proven and reliable in achieving the specified performance goals and are readily available.

#### Cost

The present-worth cost associated with Alternative SC-3 is calculated using a discount rate of 3.2% and a 2-year time interval. The present-worth costs associated with the lower aquifer components of the groundwater alternatives are calculated using the same discount rate and an eight-year time interval for the action alternatives if only on-site groundwater extraction wells are used and a six-year time interval if both on-site and off-site groundwater extraction wells are used. The present-worth costs associated with the upper aquifer components of the groundwater alternatives are calculated using a discount rate of 3.2% and five-year and two-year time frames, respectively, for Alternative GW-2 and Alternative GW-4. Although the time required to implement Alternative GW-3 (in-situ chemical oxidation for treatment of upper aquifer and groundwater extraction and treatment for lower aquifer) is less than a year, the present-worth costs were calculated using a five-year time interval to allow for additional testing and treatment should a reoccurrence of contaminants occur.

The estimated capital, operation, maintenance, and monitoring (OM&M), and present-worth costs for each of the alternatives are presented below.

<u>Alternative</u>	<u>Capital</u>	<u>Annual OM&amp;M</u>	<u>Total Present-Worth</u>
SC-1	\$0	\$0	\$0
SC-2	\$5,299,000	\$0	\$5,299,000
SC-3	\$1,008,000	\$824,000	\$2,383,000
GW-1	\$0	\$0	\$0
GW-2	\$2,476,000- \$3,029,000	\$682,000- \$727,000	\$6,387,000- \$6,652,000
GW-3	\$1,750,000- \$2,303,000	\$413,000- \$458,000	\$4,159,000- \$4,425,000
GW-4	\$1,189,000- \$1,742,000	\$673,500- \$718,500	\$4,168,000- \$4,433,000



As can be seen by the cost estimates, Alternative SC-1 is the least costly soil alternative at \$0. Alternative SC-2 is the most costly soil alternative at \$5,299,000. The least costly groundwater remedy is Alternative GW-1 at \$0. Alternative GW-2 is the most costly groundwater alternative estimated to range from \$6,387,000-6,652,000, depending on whether groundwater from the lower aquifer is extracted only from on-site wells (lower cost) or from both on-site and off-site wells (higher cost.)

#### State Acceptance

NYSDEC concurs with the preferred source control and groundwater alternatives.

#### Community Acceptance

Community acceptance of the preferred alternative will be assessed in the ROD following review of the public comments received on the Proposed Plan.

### **PROPOSED REMEDY**

Based upon an evaluation of the various alternatives, EPA and NYSDEC recommend Alternative SC-3 (excavation of contaminated surface soils, contents of the dry wells, sumps, and trench, and off-site treatment/disposal, and ISVE for subsurface contaminated soils) and Alternative GW-3 (in-situ chemical oxidation for treatment of upper aquifer and groundwater extraction and treatment for lower aquifer) as the preferred remedy for soil and groundwater, respectively. Specifically, this would involve the following:

- Excavation of the contents of the dry wells, the sumps and trench inside the building, and surface soils contaminated with VOCs, SVOCs, pesticides and metals. The estimated volume of the contaminated soil to be excavated is 270 cubic yards. Excavation of the surface soil, sumps, and building trench would be to approximately two feet. Confirmatory sampling would be conducted to ensure that all soils above the cleanup objectives have been removed. The excavated areas would be backfilled with clean fill and the previously paved areas would be re-paved. All excavated material would be characterized and transported for treatment and/or disposal at an off-site RCRA-compliant facility.
- Treatment of the VOC-contaminated unsaturated soils using ISVE in on-site source areas and underneath two adjacent affected buildings. The extracted vapors would be treated by granular activated carbon and/or other appropriate technologies before being vented to the atmosphere. Post-treatment confirmatory soil samples would be collected to ensure that the entire source area has been effectively treated to the cleanup objectives. Should the former daycare center or former billiards parlor buildings be occupied during the course of the remediation, monitoring to assure that no unacceptable vapor exposure takes place would be instituted, and the ventilation system installed during the RI would be appropriately maintained

- Decontamination of the building floor through vacuuming and power washing. All vacuumed dust and wash water would be transported for treatment and/or disposal at an off-site RCRA-compliant facility.
- In-situ treatment of the on-site contaminated groundwater in the upper aquifer in the source area by injection of an oxidizing agent, such as  $\text{KMnO}_4$  or  $\text{H}_2\text{O}_2$ , via on-site injection wells. The oxidizing agent would chemically transform the VOCs into less toxic compounds or to carbon dioxide, and water. The exact configuration and number of injection wells would be determined during the remedial design. The system would be operated until MCLs are attained in the groundwater.
- Collection of the contaminated groundwater in the lower aquifer with extraction wells if confirmatory sampling during the remedial design phase indicates that the site is the source of the contamination.
- Treatment of the extracted groundwater at an on-site facility by air stripping, carbon adsorption, and methods appropriate for treatment of metals. The treated water would be reinjected into the aquifer.
- In consultation with NYSDEC, the extent of the off-site groundwater contamination and its potential impact on the public water supply wells would be determined during the remedial design phase. Based on the evaluation of off-site groundwater data that would be collected, if it is determined that site-related contamination is affecting the aquifer, the proposed remedy would be expanded, as necessary, to include the off-site groundwater contamination and its potential impacts on the public water supply wells.
- Long-term groundwater monitoring in order to verify that the concentrations and the extent of groundwater contaminants are declining, that the remedies remain effective, and that public water supplies are protected. The exact frequency and parameters of sampling and the location of any additional monitoring wells would be determined during the design phase.

Bench- and pilot-scale treatability studies and groundwater modeling would be performed to optimize the effectiveness of the injection system and to determine optimum installation locations for the injection-well points.

Because the preferred remedy would result in contaminants remaining on-site above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the site be reviewed at least once every five years. If justified by the review, additional remedial actions may be implemented.

#### **Basis for the Remedy Preference**

While Alternative SC-2 and Alternative SC-3, would both effectively achieve the soil cleanup levels, Alternative SC-2 would be significantly more expensive than Alternative SC-

3. In addition, potentially difficult factors related to the excavation of soils down to fifty feet bgs adjacent to on-site buildings, and to the staging of the excavated soil for off-site treatment/disposal in such a limited area, would render Alternative SC-2 more difficult to implement than Alternative SC-3.

While Alternative SC-3 would take longer to achieve the soil cleanup levels than Alternative SC-2 (an estimated two years versus six months), considering that the groundwater component of the preferred remedy would address the contaminated groundwater in an estimated eight years, the increase in the time needed to clean up the soil would not be a significant concern. Therefore, EPA believes that Alternative SC-3 would effectuate the soil cleanup while providing the best balance of tradeoffs with respect to the evaluating criteria.

All three of the active treatment groundwater alternatives are estimated to take eight years to restore groundwater quality in the lower aquifer. Restoration of the upper aquifer, which is more likely to affect the soil vapor content of the overlying soils, is estimated to be achieved in one month for the preferred alternative, Alternative GW-3, whereas the time needed for upper aquifer cleanup by Alternatives GW-2 and GW-4 is five and two years, respectively. Finally, Alternative GW-2 is approximately fifty percent greater than the cost of Alternatives GW-3 and GW-4, which have similar costs. Therefore, EPA has identified Alternative GW-3 as its preferred groundwater alternative since it would effectuate the groundwater cleanup while providing the best balance of tradeoffs among the alternatives with respect to the evaluation criteria.

The preferred remedy is believed to provide the greatest protection of human health and the environment, provide the greatest long-term effectiveness, be able to achieve the ARARs more quickly, or as quickly, as the other alternatives, and is cost-effective. Therefore, the preferred remedy will provide the best balance of tradeoffs among alternatives with respect to the evaluation criteria. EPA and NYSDEC believe that the preferred remedy will treat principal threats, be protective of human health and the environment, comply with ARARs, be cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The preferred remedy also will meet the statutory preference for the use of treatment as a principal element.